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"Western Treasure -- Deep, Wet Snow"

FEDERAL-STATE COOPERATIVE
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for
MONTANA

MAY 1, 1948

by

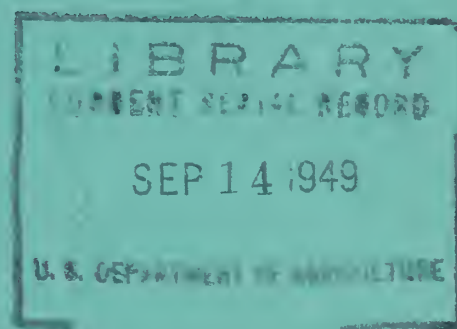
Montana Agricultural Experiment Station
and
Division of Irrigation, Soil Conservation Service
United States Department of Agriculture

in cooperation with

U. S. Forest Service
U. S. Geological Survey

U. S. National Park Service
State Engineer of Montana

U. S. Bureau of Reclamation



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Report Prepared

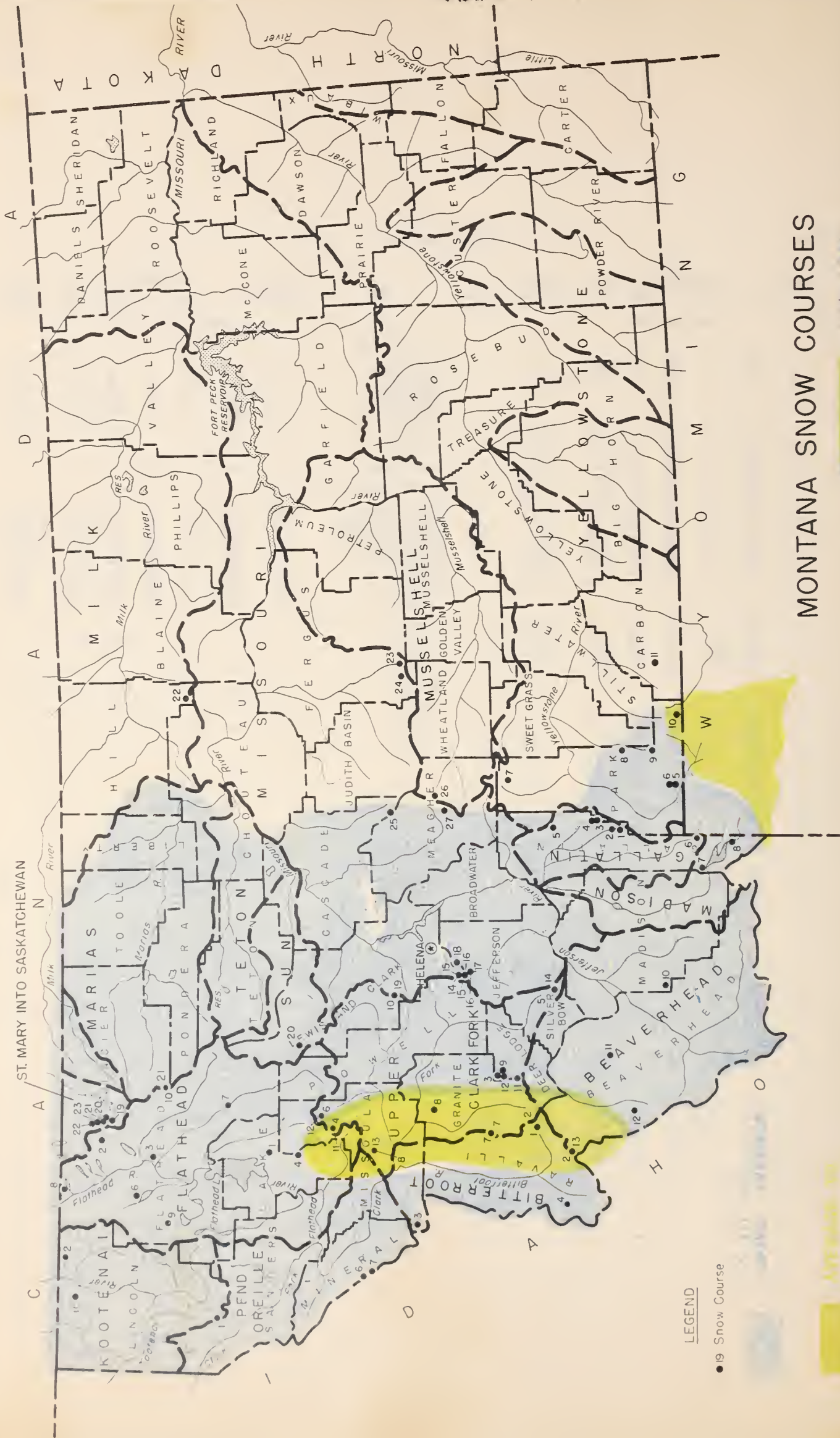
By

O. W. Monson — Irrigation Engineer

Division of Irrigation
Soil Conservation Service
State Engineer of Montana
and
Montana State Agricultural Experiment Station
Bozeman, Montana

INDEX TO MONTANA SNOW COURSES

| Name | Montana Number | Elev. | Location | | | Record Began | Measuring Dates ^a | Measured By: ^b | Name | Montana Number | Elev. | Location | | | Record Began | Measuring Dates ^a | Measured By: ^b | | | | | | | | | | | | | | | | |
|-------------------------|----------------|-------|----------|---------|-------|--------------|------------------------------|---------------------------|-----------------------|----------------|-------|----------|---------|-------|--------------|------------------------------|------------------------------------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | Sec. | Twp. | Range | | | | | | | Sec. | Twp. | Range | | | | | | | | | | | | | | | | | | | |
| | | | Lat. | Long. | | | | | | | | Lat. | Long. | | | | | | | | | | | | | | | | | | | | |
| COLUMBIA DRAINAGE | | | | | | | | | | | | | | | | | MISSOURI RIVER DRAINAGE (Cont.) | | | | | | | | | | | | | | | | |
| KAI RIVER | | | | | | | | | | | | | | | | | YELLOWSTONE RIVER | | | | | | | | | | | | | | | | |
| Mountain | 1 | 6000 | 1 | 25N | 31W | 1937 | 4,5 | 1 | Crevice #1 | 5 | 8400 | 29 | 9S | 9E | 1935 | 3,4 | 1 | | | | | | | | | | | | | | | | |
| rd Basin | 2 | 6800 | 24 | 37N | 26W | 1937 | 4,5 | 1 | Crevice #2 | 8 | 8150 | 26 | 9S | 9E | 1935 | 3,4 | 1 | | | | | | | | | | | | | | | | |
| ountain | 10 | 6000 | 4 | 36N | 29W | 1937 | 2,3,4,5 | 1 | Porcupine | 7 | 6600 | 10 | 4N | 10E | 1938 | 3,4 | 1 | | | | | | | | | | | | | | | | |
| CLARE FORK | | | | | | | | | | | | | | | | | SHELLSHELL RIVER | | | | | | | | | | | | | | | | |
| man Reservoir | 1 | 6200 | 2 | 8S | 5W | 1936 | 1,2,3,4,5 | 2 | Hells Canyon | 8 | 6000 | 23 | 5S | 12E | 1940 | 3,4 | 6 | | | | | | | | | | | | | | | | |
| Fork Ranger Station | 2 | 6400 | 18 | 2E | 17W | 1937 | 2,3,4,5 | 1 | Independence | 9 | 8000 | 22 | 7S | 12E | 1940 | 3,4 | 6 | | | | | | | | | | | | | | | | |
| uard | 3 | 6450 | 6 | 5N | 15W | 1939 | 2,3,4 | 3 | Cooks City | 10 | 7400 | 25 | 9S | 14E | 1937 | 1,2,3,4,5 | 5 | | | | | | | | | | | | | | | | |
| Fork Jocko | 4 | 6530 | 3 | 17N | 17W | 1941 | 3,4 | 4 | Camp Senia | 11 | 7890 | 2 | 8S | 18E | 1938 | 3,4 | 1 | | | | | | | | | | | | | | | | |
| tone Pass | 5 | 7200 | 11 | 1E | 7W | 1938 | 2,3,4,5 | 1 | | | | | | | | | | MISSOURI RIVER MAIN STEM | | | | | | | | | | | | | | | |
| lake | 8 | 4300 | 11 | 18N | 16W | 1947 | 3,4,5 | 1 | Orville Harris | 26 | 6600 | 31 | 10N | 9E | 1938 | 3,4 | 6 | | | | | | | | | | | | | | | | |
| aho Summit | 7 | 7258 | 30 | 6W | 17W | 1937 | 4,5 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rock Mountain | 8 | 7100 | 26 | 10N | 18W | 1937 | 4,5 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ern Cross | 9 | 6500 | 9 | 6N | 13W | 1939 | 2,3,4 | 3 | Pipestone Pass | 14 | 7200 | 11 | 1N | 7W | 1938 | 2,3,4,5 | 1 | | | | | | | | | | | | | | | | |
| le Pass | 10 | 6900 | 18 | 13N | 7W | 1934 | 3,4,5 | 2 | Tennile Creek, Lower | 15 | 6250 | 13 | 8N | 6W | 1935 | 1,2,3,4,5 | 2 | | | | | | | | | | | | | | | | |
| lake No. 2 | 11 | 7780 | 19 | 4N | 13W | 1939 | 4,6 | 1 | Tennile Creek, Middle | 16 | 6800 | 13 | 8N | 6W | 1934 | 1,2,3,4,5 | 2 | | | | | | | | | | | | | | | | |
| t Mill | 12 | 6500 | 19 | 5N | 13W | 1939 | 2,3,4 | 3 | Tennile Creek, Upper | 17 | 8000 | 19 | 8N | 6W | 1935 | 1,2,3,4,5 | 2 | | | | | | | | | | | | | | | | |
| t Mountain #1 | 13 | 7400 | 6 | 14N | 18W | 1938 | 2,3,4,5 | 1 | Cheesman Reservoir | 18 | 8200 | 2 | 8E | 5W | 1936 | 1,2,3,4,6 | 2 | | | | | | | | | | | | | | | | |
| le Creek, Lower | 14 | 6250 | 13 | 8S | 6W | 1935 | 1,2,3,4,5 | 2 | Stemple Pass | 19 | 6900 | 16 | 15N | 7W | 1934 | 3,4,5 | 2 | | | | | | | | | | | | | | | | |
| le Creek, Middle | 15 | 6800 | 13 | 8S | 6W | 1934 | 1,2,3,4,5 | 2 | Half Moon | 23 | 6000 | 22 | 12N | 18E | 1940 | 3,4 | 1,6 | | | | | | | | | | | | | | | | |
| le Creek, Upper | 16 | 8000 | 19 | 8S | 5W | 1935 | 1,2,3,4,6 | 2 | Crystal Lake | 24 | 6100 | 24 | 12N | 17E | 1941 | 3,4 | 1,6 | | | | | | | | | | | | | | | | |
| ROOT RIVER | | | | | | | | | | | | | | | | | KINGS HILL | | | | | | | | | | | | | | | | |
| Fork Ranger Station | 1 | 5400 | 16 | 2E | 17W | 1937 | 2,3,4,5 | 1 | Grasshopper | 27 | 7000 | 18 | 9N | 8E | 1938 | 3,4 | 1,6 | | | | | | | | | | | | | | | | |
| as Pass | 2 | 7100 | 4 | 2S | 19W | 1934 | 2,3,4,5 | 1,2 | | | | | | | | | | SUN RIVER | | | | | | | | | | | | | | | |
| reek Pasture | 3 | 4500 | 24 | 11N | 24W | 1937 | 2,3,4,6 | 1 | Goat Mountain | 20 | 7000 | 47°31' | 112°55' | 1934 | 4,5 | 2 | | | | | | | | | | | | | | | | | |
| ce Camp | 4 | 5580 | 19420 | 15 | 25W | 1937 | 2,3,4,5 | 1 | | | | | | | | | | MARIAS RIVER | | | | | | | | | | | | | | | |
| aho Summit | 7 | 7258 | 30 | 6E | 17W | 1937 | 4,6 | 1 | Marias Pass | 21 | 5250 | 48°19' | 118°21' | 1934 | 1,2,3,4,6 | 2 | | | | | | | | | | | | | | | | | |
| t Mountain #1 | 8 | 7400 | 6 | 14N | 18W | 1936 | 3,4,5 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| HEAD RIVER | | | | | | | | | | | | | | | | | MILK RIVER | | | | | | | | | | | | | | | | |
| reek | 1 | 6750 | 647 | 22N | 18W | 1941 | 4,5 | 4 | Rocky Boy | 22 | 5200 | 15 | 26N | 16E | 1942 | 3,4 | 6 | | | | | | | | | | | | | | | | |
| e Queen | 2 | 4700 | 7 | 36N | 17W | 1939 | 3,4 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| t Mountain | 3 | 5600 | 24 | 31N | 19W | 1937 | 4,6 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ountain | 4 | 6750 | 1 | 20N | 19W | 1941 | 3,4 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mountain | 5 | 7000 | 47°33' | 112°54' | 1934 | 3,4 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Roaring Creek Divide | 6 | 5770 | 35 | 32N | 22W | 1942 | 4,6 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ridge | 7 | 6200 | 8 | 25E | 15W | 1937 | 4,5 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| ahn | 8 | 4300 | 7 | 37N | 21W | 1946 | 4,5 | 5 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Creek | 9 | 4300 | 34 | 30N | 24W | 1937 | 4,5 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| s Pass | 10 | 5250 | 48°19' | 113°21' | 1934 | 1,2,3,4,5 | 2 | | | | | | | | | | SASKATCHEWAN RIVER DRAINAGE | | | | | | | | | | | | | | | | |
| Fork Jocko | 11 | 6330 | 3 | 17N | 17W | 1941 | 3,4,5 | 4 | | | | | | | | | | | | | | | | | | | | | | | | | |
| lake | 12 | 4300 | 11 | 18N | 16W | 1947 | 3,4,5 | 1 | | | | | | | | | | ST. MARY RIVER | | | | | | | | | | | | | | | |
| GREVILLE RIVER | | | | | | | | | | | | | | | | | Piegan Pass #6 | | | | | | | | | | | | | | | | |
| Mountain | 1 | 6000 | 1 | 25N | 31W | 1937 | 4,5 | 1 | Piegan Pass #4 | 20 | 5000 | 48°46' | 113°40' | 1922 | 5 | 2,8 | | | | | | | | | | | | | | | | | |
| south Summit | 6 | 7000 | 21 | 15N | 27W | 1937 | 3,4,5 | 1 | Mount Allen | 21 | 7000 | 48°44' | 113°40' | 1922 | 5 | 2,8 | | | | | | | | | | | | | | | | | |
| o Creek | 7 | 8200 | 9&16 | 14N | 27W | 1937 | 3,4,5 | 1 | Ptarmigan #8 | 22 | 5800 | 48°50' | 113°42' | 1922 | 5 | 2,8 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | Iceberg Lake | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 23 6000 48°50' 113°42' 1922 5 2,8 | | | | | | | | | | | | | | | | |
| MISSOURI RIVER DRAINAGE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HEAD RIVER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| light | 10 | 6950 | 22 | 8S | 7W | 1945 | 3,4 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| rn | 11 | 8450 | 15 | 4S | 12W | 1934 | 3,4,5 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| lake | 12 | 6720 | 10 | 6S | 16W | 1945 | 3,4 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| as Pass | 13 | 7100 | 4 | 2S | 19W | 1934 | 2,3,4,5 | 1,2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| N RIVER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ellowsstone | 7 | 6550 | 22 | 11S | 3E | 1934 | 1,2,3,4,5 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 8 | 6700 | 34&35 | 13S | 5E | 1934 | 1,2,3,4,5 | 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| FIN RIVER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slide | 1 | 8100 | 14 | 5S | 6E | 1935 | 3,4,5 | 2,6 | | | | | | | | | | 1. U. S. Forest Service | | | | | | | | | | | | | | | |
| adow Extension | 2 | 6600 | 22 | 4S | 6E | 1934 | 3,4,5 | 2,6 | | | | | | | | | | 2. U. S. Geological Survey and U. S. Engineer Corps | | | | | | | | | | | | | | | |
| lake #1 and #2 | 3 | 6600 | 30 | 3S | 7E | 1935 | 1,2,3,4 | 6,7 | | | | | | | | | | 3. Montana Power Company | | | | | | | | | | | | | | | |
| orld Trail | 4 | 6700 | 24 | 3S | 6E | 1939 | 3,4 | 6,7 | | | | | | | | | | 4. U. S. Indian Service | | | | | | | | | | | | | | | |
| reak | 5 | 7000 | 10 | 1N | 6E | 1939 | 3,4 | 1,6 | | | | | | | | | | 5. National Park Service | | | | | | | | | | | | | | | |
| le | 6 | 7150 | 1 | 11S | 5E | 1934 | 2,3,4,5 | 2 | | | | | | | | | | 6. Montana Experiment Station | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 7. City of Bozeman | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 8. Dominion Water and Power Bureau | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | c. Discontinued 1943-1947 | | | | | | | | | | | | | | | | |



SUMMARY

Above normal runoff from the watersheds of Western Montana may be expected, together with exceptionally high peak flows from mountain streams, because of the above average snow pack as measured May 1st. This confirms the prediction made last month.

Soil moisture conditions in the dry farming areas of the state are below average and particularly at the Huntley Field Station are reported as unfavorable.

Reservoir storage is about 65% filled, which is approximately the same as for 1947 on the same date.

Precipitation at a number of representative stations is slightly below normal.

WATER SUPPLY OUTLOOK IN MONTANA, MAY 1, 1948

Stream Flow - The stream flow was slightly above normal on most streams in Montana during April, but the flow of the Yellowstone at Corwin Springs was 5% below normal. The average flow of the Judith River near Utica was three times the normal for April. Forecast estimates are given for a number of representative gauging stations.

Soil Moisture Conditions - Observations made at the North Montana Branch Station on May 1st indicate that surface moisture is better than a year ago, being generally sufficient for germination of spring planting crops. Continuously cropped land lacks sub-soil reserves but is probably in better condition than a year ago, due to improved surface moisture for germination. Crops planted on fallow are emerging with excellent stands but the reserve of moisture in the third and fourth levels is much below normal and even less than that of a year ago.

Stubble fields to be fallowed in 1948 are now rapidly becoming weedy and fast losing accumulated winter moisture. Earlier than usual initial working for fallow is therefore indicated.

At the Central Montana Branch Station seeding conditions are reported as ideal, with most of the work already completed. The accumulated moisture for the first four months of 1948 is reported to be .48 of an inch below the 39 year average.

At the Huntley Field Station the precipitation during April was considerably less than a year ago. Soil samples indicate a marked depreciation in soil moisture as compared with those taken on the 1st of April.

Moisture penetration on plots fallowed in 1947 has reached a depth of from 20 to 25 inches.

Reservoir Storage - In the Columbia Basin, 15 reservoirs having combined capacity of 205,045 acre feet were 65% full on May 1st. A year ago the amount held in storage was 55% of the total capacity.

In the Missouri Basin, 17 reservoirs for which reports are available, were 65% full, as compared with 67% for the same date in 1947.

Fort Peck reservoir contains 13,790,000 acre feet, as compared with 15,230,000 acre feet a year ago.

NARRATIVE FORECAST

Missouri Basin

Gallatin River - The water content on the Devils Slide snow course is 49% above the 14 year average. At Hood Meadow, at an elevation of 6600 feet, the water content was 175% above the 14 year average. The average for 3 courses on this watershed is approximately 86% above average.

Madison River - The average of 3 snow courses is over 69% above the 14 year average for the period of record. This is a considerable improvement over the April 1st indications.

Jefferson River - The water content is approximately 20% above average.

Main Stem Above Great Falls - Snow surveys made on the watersheds of the minor tributaries to the Missouri between Three Forks and Great Falls indicate an average water content 60% above the average for the period of record. This indicates a slight improvement over the April 1st measurements.

Sun River - No measurements were made on the Sun River watersheds as of May 1st. The April 1st survey indicated a water content approximately 33% above average.

Marias River - Water content at Marias Pass on May 1st is 110% above the average for the 14 year period of record.

Musselshell River - The water content observed at Kings Hill on May 1st is approximately 47% above the average for the period of record. This is one of two snow courses on which a gain occurred during April.

Yellowstone Basin

Main Stem Above Livingston - Measurements made May 1st at Canyon showed a depth of 36.5 inches of snow containing 10.8 inches of water. At Lake the snow depth was 31.6 inches and the water content 9.5 inches. This is approximately 5% above the normal conditions.

Shields River - No measurements were made on May 1st. On April 1st the water content readings were 50% above average.

Clarks Fork River - Measurements made at Cooke City showed a snow depth of 21.8 inches and water content of 6.5 inches. This compares with 4.8 inches a year ago. On April 1st the water content was 45% above average.

Columbia Basin

Bitterroot Watershed - The water content at two locations on the Bitterroot watershed is approximately 20% above the average. At East Fork Ranger Station, at an elevation of 5400 feet, the snow has entirely disappeared.

Blackfoot River - Water content as of May 1st is 15% above the average. There was a slight loss since April 1st.

Clarks Fork Above Milltown - The water content indicated has increased 1.5 inches since April 1st. It is now about 50% above average.

Flathead River - On the Flathead River watershed the accumulated snow pack is approximately 45% above the average.

Kootenai River - The water content on Red Mountain snow course as of May 1st is 16.2 inches, as compared with an average of 13 inches. This is equal to 24% above the 12 year average.

FORECAST OF RUNOFF AT A NUMBER OF
REPRESENTATIVE GAUGING STATIONS IN THE
MISSOURI AND YELLOWSTONE BASINS

| Name of Stream | May - June Sec. Ft. Days | July-Aug.-Sept. Sec. Ft. Days | May - June Sec. Ft. Days |
|---|-----------------------------|----------------------------------|-----------------------------|
| Gallatin River at Gateway | 189,800 \pm 15% | 44,000 \pm 25% | 121,642 |
| Hyalite Creek | 12,966 \pm 15% | 6,553 \pm 15% | 9,320 |
| Madison River at West Yellowstone | 49,600 \pm 15% | 32,000 \pm 15% | 42,467 |
| North Fork of Musselshell River at Delpine | 2,000 \pm 20% | 1,100 \pm 15% | 1,247 |
| Yellowstone River at Corwin Springs | 514,000 \pm 10% | 381,600 \pm 20% | 467,367 |
| Shields River at Wilsall | 17,000 \pm 25% | 3,600 \pm 20% | 13,007 |
| Clarks Fork of Yellowstone at Chance | 300,720 \pm 15% | May-June-July | 233,200 |
| West Fork of Rock Creek Below Basin Creek | 18,000 \pm 25% | 19,600 \pm 25% | 12,425 |
| Red Lodge Creek Above Cooney Reservoir | *10,669 \pm 20% | Maximum Month | 7,710 |
| Missouri River at Fort Benton | 836,650 \pm 15% | | 722,522 |

* Probably Low

Montana SNOW SURVEYS May 1, 1948

| MISSOURI BASIN | | SNOW MEASUREMENTS | | | | | | | | | | Past Record | |
|---------------------------|-------|-------------------|----------------|--------|----------------|-------------|------------------------|--------------|------|-----------|------|-----------------|------|
| WATERSHED and SNOW COURSE | | LOCATION | | | | | | | | | | Years of Record | |
| State No. | Sec. | Twp. or Lat. | Range or Long. | Elev. | Date of Survey | Depth (in.) | Water Content (Inches) | Approx. Date | 1946 | 1947 | 1948 | 1946 | 1948 |
| | | | | | | | | | | | | | |
| <u>Gallatin River</u> | | | | | | | | | | | | | |
| Devil's Slide | Mont. | 1 | 14 | 5S | 6E | 8100 | 4-30 | 78.8 | 30.5 | 28.2 | 22.3 | 14 | 20.4 |
| Hood Meadow Ext. | " | 2 | 22 | 4S | 6E | 6600 | 4-30 | 30.6 | 9.9 | 7.3 | 1.3 | 14 | 3.6 |
| 21 Mile | " | 6 | 1 | 11S | 5E | 7150 | 4-28 | 36.4 | 12.6 | 14.6 | 10.3 | 14 | 9.3 |
| <u>Madison River</u> | | | | | | | | | | | | | |
| Hebgen Lake | " | 7 | 22 | 11S | 3E | 6550 | 4-28 | 22.4 | 7.4 | 1.6 | 1.2 | 14 | 2.2 |
| 21 Mile | " | 6 | 1 | 11S | 5E | 7150 | 4-28 | 36.4 | 12.6 | 14.6 | 10.3 | 14 | 9.3 |
| West Yellowstone | " | 8 | 34 | 13S | 5E | 6700 | 4-28 | 13.1 | 4.5 | 3.7 | 1.8 | 14 | 3.0 |
| <u>Jefferson River</u> | | | | | | | | | | | | | |
| Elkhorn | " | 11 | 15 | 4S | 12W | 8450 | 4-29 | 29.0 | 8.8 | No Report | | | 4.4 |
| Gibbons Pass | " | 13 | 4 | 2S | 19W | 7100 | 4-30 | 52.1 | 21.3 | 25.4 | 17.4 | 12 | 18.4 |
| <u>Main Stem</u> | | | | | | | | | | | | | |
| Above Great Falls | " | 18 | 2 | 8N | 6W | 6200 | 4-30 | 12.8 | 4.6 | 1.2 | 0.0 | 12 | 1.1 |
| Chesman | " | 25 | 35 | 13N | 7E | 7950 | 4-29 | 40.4 | 14.6 | No Report | | | 9.9 |
| Kings Hill | " | 15 | 13 | 8N | 6W | 6250 | 5-3 | 6.8 | 2.1 | 2.1 | 0.0 | 13 | 1.5 |
| Rimini Lower | " | 16 | 13 | 8N | 6W | 6800 | 5-4 | 29.4 | 8.9 | 11.8 | 1.4 | 13 | 6.1 |
| Rimini Middle | " | 17 | 19 | 8N | 5W | 8000 | 5-4 | 43.6 | 14.6 | 14.6 | 4.6 | 13 | 9.3 |
| Rimini Upper | " | 19 | 16 | 13N | 7W | 6900 | 4-30 | 27.0 | 8.3 | 7.8 | 2.0 | 14 | 4.9 |
| Stemple Pass | " | 21 | 48.3N | 113.4W | | 5250 | 5-2 | 36.9 | 15.3 | 11.5 | 8.8 | 14 | 7.2 |
| <u>Marias River</u> | | | | | | | | | | | | | |
| Marias Pass | " | 25 | 35 | 13N | 7E | 7950 | 4-29 | 40.4 | 14.6 | No Report | | | 9.9 |
| <u>Mussellshell River</u> | | | | | | | | | | | | | |
| Kings Hill | " | 25 | 35 | 13N | 7E | 7950 | 4-29 | 40.4 | 14.6 | No Report | | | 9.9 |

* Average water content for period of record.

Montana SNOW SURVEYS May 1, 1948

* Average water content for period of record.

Montana SNOW SURVEYS May 1, 1948

| COLUMBIA WATERSHED and SNOW COURSE | LOCATION | | | SNOW COVER MEASUREMENTS | | | | | | | Past Record | |
|---|-----------|------|--------------|-------------------------|-------|----------------|------------------|------------------------|------|-----------------|----------------------------|------|
| | State No. | Sec. | Twp. or Lat. | Range or Long. | Elev. | Date of Survey | Snow Depth (in.) | Water Content (Inches) | | Years of Record | Av. Water Content (Inches) | * |
| | | | | | | | | 1948 | 1947 | | | |
| Bitterroot | Mont. M13 | 4 | 2S | 19W | 7100 | 4-30 | 52.0 | 21.3 | 25.4 | 12 | 17.4 | 18.4 |
| Gibbons Pass | " | 30 | 6N | 17W | 7258 | 5-3 | 66.0 | 26.7 | 30.7 | 12 | 20.9 | 21.3 |
| Skalkaho | | 16 | 2N | 17W | 5400 | 4-30 | 0.0 | 0.0 | 0.0 | 10 | 0.0 | 0.0 |
| E. Fk. Ranger Sta." | | | | | | | | | | | | |
| Blackfoot River | " | 9 | 14N | 18W | 7400 | 4-30 | 70.0 | 31.2 | 44.6 | 12 | 30.2 | 27.0 |
| Stuart Mt. | | | | | | | | | | | | |
| Clark Fork Above Milltown | " | 3 | 4N | 13W | 7780 | 5-3 | 57.5 | 21.2 | 17.9 | 11 | 10.1 | 13.8 |
| Storm Lake | | | | | | | | | | | | |
| Clark Fork Below Milltown | | | | | | | | | | | | |
| Lookout | Idaho | 4 | 47N | 6E | 5250 | 4-30 | 80.0 | 34.8 | 27.2 | 12 | 32.8 | 22.0 |
| Packers Meadow | " | 15 | 38N | 15E | 5700 | 5-1 | 46.0 | 22.0 | 26.1 | 12 | 11.7 | 10.5 |
| Flathead | | | | | | | | | | | | |
| Hell Roaring | | | | | | | | | | | | |
| Cr. Divide | Mont. | 6 | 35 | 32N | 5770 | 4-29 | 72.0 | 31.0 | 32.1 | 6 | 30.5 | 23.4 |
| Desert Mt. | " | 3 | 24 | 31N | 5600 | 4-28 | 42.0 | 14.9 | 16.0 | 12 | 10.5 | 8.3 |
| Kootenai | | | | | | | | | | | | |
| Red Mountain | " | 10 | 4 | 36N | 6000 | 5-3 | 42.0 | 16.2 | 18.8 | 12 | 18.7 | 13.0 |

* Average water content for period of record

STORAGE IN RESERVOIRS OF MONTANA

COLUMBIA RIVER BASIN

APRIL 30, 1948

DATA FURNISHED BY OPERATING ORGANIZATIONS

COMPILED BY WATER RESOURCES BRANCH, U. S. GEOLOGICAL SURVEY, HELENA, MONT.

| Reservoir | Located on or Diverting From | Usable Capacity Acre-feet | Contents This Month-End | Contents Month Ago | Contents Year Ago |
|-------------------------------|---------------------------------|---------------------------------|-------------------------------|--------------------------|-------------------------|
| a Georgetown Lake | Flint Creek | 31,000 | 20,970 | 25,690 | 22,270 |
| b W.Fk.Bitterroot Res. | W.Fk.Bitterroot R. | 31,700 | 20,500 | 10,000 | 22,000 |
| a Flathead L. (Somers) | Flathead River | *1,791,000 | 948,400 | 558,200 | 1,137,000 |
| d Little Bitterroot L. | Little Bitterroot R. | 18,000 | 13,400 | 13,400 | 7,800 |
| d Hubbart Reservoir | Little Bitterroot R. | 12,100 | 12,120 | 10,960 | 7,640 |
| d Upper Dry Fork Res. | Dry Fork Creek | 2,700 | 2,070 | 1,120 | 2,000 |
| d Dry Fork Res. | Dry Fork Creek | 4,000 | 3,490 | 2,570 | 3,600 |
| d Twin Reservoir Canals | (Mission Valley) | 600 | 238 | 170 | 262 |
| d Pablo Res. Canals | (Mission Valley) | 25,000 | 15,670 | 13,210 | 15,290 |
| d Lower Crow Res.Crow Cr. | (Mission Valley) | 10,350 | 9,510 | 8,580 | 9,840 |
| d Kicking Horse Res. Can. | (Mission Valley) | 8,350 | 7,840 | 6,830 | 3,610 |
| d Ninepipe Res. Can. | (Mission Valley) | 14,870 | 12,250 | 11,800 | 12,250 |
| d McDonald Res. Post Cr. | (Mission Valley) | 8,225 | 6,420 | 7,480 | 2,560 |
| d Mission Res. Mission Cr. | (Mission Valley) | 7,250 | 2,740 | 1,560 | 785 |
| d Tabor Res. Dry Cr. | (Mission Valley) | 23,300 | 6,050 | 2,020 | 3,070 |
| d Lower Jocko L.Jocko R. | (Mission Valley) | 7,600 | Snowbound | Snowbound | 1,060 |

Data furnished by:

- a Montana Power Company
b Montana State Water Conservation Board

- d Office of Indian Affairs

* Contents at elev. 2893, considering 2878 as base. Contents at authorized min. elev. 2883, 572,300 acre-feet.

STORAGE IN RESERVOIRS OF MONTANA

MISSOURI RIVER BASIN

APRIL 30, 1948

DATA FURNISHED BY OPERATING ORGANIZATIONS

COMPILED BY WATER RESOURCES BRANCH, U. S. GEOLOGICAL SURVEY, HELENA, MONT.

| Reservoir | Located on or diverting from | Usable Capacity Acre-feet | Contents this Month-end | Contents Month Ago | Contents Year Ago |
|------------------------------------|------------------------------|---------------------------|-------------------------|--------------------|-------------------|
| ^a Lake Sewall | Missouri | 37,800 | 23,650 | 36,980 | 35,470 |
| ^a Hauser Lake | Missouri | 52,090 | 31,440 | 45,730 | 39,730 |
| ^a Holter Reservoir | Missouri | 73,600 | 51,200 | 43,240 | 59,540 |
| ^b Ft. Peck Reservoir | Missouri | 19,000,000 | 13,790,000 | 13,440,000 | 15,230,000 |
| ^a Hebgen Reservoir | Madison R. | 345,000 | 185,300 | 257,600 | 179,100 |
| ^a Madison Reservoir | Madison R. | 41,000 | 36,390 | 38,010 | 38,470 |
| ^d Gibson Reservoir | N. Fk. Sun R. | 105,000 | 71,490 | 64,410 | 64,640 |
| ^d Willow Creek | N. Fk. Sun & Willow Cr. | 32,300 | 19,060 | 17,170 | 16,940 |
| ^d Pishkun Reservoir | N. Fk. Sun R. | 32,000 | 20,840 | 20,840 | 17,230 |
| ^e Lower Two Medicine L. | Two Medicine R. | 14,000 | 0 | 0 | 9,800 |
| ^e Four Horns Res. | Badger Creek | 20,000 | 7,420 | 7,360 | 11,800 |
| ^f Birch Creek Res. | Birch Creek | 30,000 | 27,210 | 20,990 | 28,380 |
| ^f L. Francis Res. | Birch & Dupuyer Cr. | 112,000 | 107,950 | 102,650 | 105,100 |
| ^d Fresno Reservoir | Milk River | 127,200 | 131,900 | 77,420 | 131,900 |
| ^a Mystic Lake | W. Rosebud Cr. | 20,800 | 2,310 | 5,750 | 3,280 |
| ^c Cooney Reservoir | Red Lodge Cr. | 27,500 | 10,720 | 6,640 | 13,440 |
| ^c Tongue River | Tongue River | 73,900 | 24,880 | 16,150 | 9,150 |
| ^g Lake Helena | Missouri River | 10,450 | 1,980 | 7,200 | 4,640 |

Data furnished by:

^a Montana Power Company
^b U. S. Army Engineers
^c Montana State Water Conservation Board
^d Bureau of Reclamation

^e Office of Indian Affairs
^f Valier Montana Land and Water Company
^g Since Apr. 26, 1945, Lake Hauser has been separated from Lake Helena by control works permitting independent regulation.

U.S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
STATE OF MONTANA, MONTHLY PRECIPITATION FOR
OCTOBER 1, 1947 - APRIL 30, 1948

| STATIONS | 1947 OCTOBER | | 1947 NOVEMBER | | 1947 DECEMBER | | 1948 JANUARY | | 1948 FEBRUARY | | 1948 MARCH | | 1948 APRIL | |
|-------------------------|-----------------|-------|------------------|-------|------------------|-------|-----------------|-------|------------------|-------|---------------|-------|---------------|-------|
| | Precip. | Dep. | Precip. | Dep. | Precip. | Dep. | Precip. | Dep. | Precip. | Dep. | Precip. | Dep. | Precip. | Dep. |
| <u>WEST OF DIVIDE</u> | | | | | | | | | | | | | | |
| Butte | 1.29 | +0.50 | 1.50 | +1.10 | 0.55 | +0.11 | 0.68 | +0.28 | 0.60 | +0.16 | 0.77 | +0.13 | 0.57 | -0.49 |
| Deer Lodge | 1.20 | +0.52 | 1.27 | +0.72 | 0.42 | -0.09 | 0.27 | -0.32 | 0.13 | -0.30 | 0.30 | -0.31 | 0.39 | -0.43 |
| Hamilton | 1.36 | +0.45 | 1.10 | +0.29 | 0.38 | -0.33 | 1.90 | +1.11 | 1.91 | +1.16 | 0.73 | +0.04 | 0.24 | -0.63 |
| Missoula | 1.09 | +0.14 | 2.41 | +1.51 | 0.78 | -0.17 | 1.32 | +0.47 | 0.97 | +0.15 | 0.41 | -0.41 | 0.65 | -0.25 |
| <u>CENTRAL DIVISION</u> | | | | | | | | | | | | | | |
| Babb | 1.60 | +0.42 | 0.82 | -0.17 | 0.50 | -0.44 | 0.71 | -0.23 | 0.73 | -0.09 | 0.84 | -0.27 | 0.83 | -0.83 |
| Dillon | 0.33 | --- | 0.44 | --- | 0.35 | --- | 0.28 | -0.55 | 0.38 | -0.34 | 0.90 | -0.26 | 0.87 | -0.81 |
| Fort Benton | 0.38 | -0.34 | 1.05 | +0.46 | 0.56 | +0.05 | 0.98 | +0.32 | 0.56 | +0.07 | 1.15 | +0.53 | 1.02 | -0.10 |
| Great Falls | 0.54 | -0.32 | 1.11 | +0.43 | 0.44 | -0.21 | 1.23 | +0.62 | 0.36 | -0.21 | 1.42 | +0.55 | --- | --- |
| Havre | 0.48 | -0.19 | 0.38 | -0.23 | 0.27 | -0.34 | 0.38 | -0.35 | 0.47 | -0.05 | 0.47 | -0.04 | 1.11 | +0.12 |
| Helena, WBO | 0.55 | -0.06 | 1.40 | +0.95 | 0.27 | -0.20 | 0.51 | -0.05 | 0.22 | -0.17 | 0.49 | -0.30 | 0.58 | -0.54 |
| Livingston | 0.84 | --- | 0.87 | --- | 0.64 | --- | 0.66 | +0.12 | 0.55 | +0.01 | 0.74 | -0.12 | 1.06 | -0.26 |
| Lewistown Arpt. | 0.23 | -0.13 | 0.88 | +0.67 | 0.62 | +0.42 | 1.03 | +0.30 | 0.33 | -0.44 | 0.86 | -0.17 | 0.99 | -0.28 |
| Mystic Lake | 1.47 | -0.37 | 1.90 | +0.32 | 0.77 | -0.27 | 3.53 | +2.39 | 1.95 | +0.87 | 1.82 | -0.23 | --- | --- |
| Bozeman, Ag.Col. | 0.68 | --- | 2.15 | --- | 1.00 | --- | 1.11 | +0.24 | 0.65 | -0.16 | 0.89 | -0.38 | 2.04 | +0.35 |
| <u>EASTERN DIVISION</u> | | | | | | | | | | | | | | |
| Billings #2 | 0.52 | --- | 0.63 | --- | 0.91 | +0.41 | 0.37 | -0.26 | 0.23 | 0.19 | 0.54 | -0.30 | 0.96 | -0.34 |
| Circle | 0.33 | -0.52 | 0.23 | -0.34 | 0.24 | -0.51 | 0.14 | -0.53 | 0.50 | -0.11 | 0.16 | -0.84 | 0.26 | -0.88 |
| Frazer | 0.43 | -0.45 | 0.60 | +0.07 | 0.46 | +0.07 | 0.29 | -0.12 | 0.75 | +0.41 | 0.51 | -0.19 | 0.88 | -0.08 |
| Malta | 0.66 | -0.07 | 0.04 | -0.37 | 0.38 | -0.08 | 0.16 | -0.31 | 0.62 | +0.25 | 0.30 | -0.24 | 0.98 | +0.18 |
| Mildred | 0.14 | -0.59 | 0.38 | +0.01 | 0.21 | -0.11 | 0.53 | +0.19 | 0.83 | +0.57 | 0.36 | -0.06 | 0.89 | -0.18 |
| Medicine Lake | 0.28 | -0.47 | 0.94 | +0.61 | 0.21 | -0.07 | 0.51 | +0.20 | 0.72 | +0.40 | 0.17 | -0.24 | 1.95 | +1.06 |
| Miles City | 0.39 | -0.53 | 0.31 | -0.26 | 0.28 | -0.35 | 0.42 | -0.24 | 0.74 | +0.23 | --- | --- | --- | --- |
| Fort Peck | 0.33 | -0.42 | 0.06 | -0.41 | 0.29 | +0.01 | 0.12 | -0.26 | 0.42 | +0.15 | 0.38 | -0.12 | --- | --- |

